Momentum / Impulse Problem Set 02

Homework for Wednesday, 04 January 2017

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A constant friction force of 25 Newtons acts on a 65 kg skier for 20 seconds. What is the skier’s change in velocity?
2. A 0.145 kg baseball pitched at 39 m/s is hit ona horizontal line drive straight back toward the pitcher at 52 m/s. If the contact time between bat and ball is 3.00 x 10^-1 seconds. Calculate the average force between the ball and bat during contact.
3. A 12,600 kg railroad car travels alone on a level, frictionless track with a constant speed of 18 m/s. A 5,350 kg load, initially at rest, is dropped into the car. What will the car’s new speed be after the load is dropped into it?
4. A golf ball of mass 0.045 kg is hit off the tee at a speed of 45 m/s. The golf club was in contact with the ball for 3.5 x 10^-3 seconds. Find:
5. The impulse imparted to the golf ball
6. The average force exerted on the ball by the golf club.
7. S ball of mass 0.440 kg moving east with a speed of3.30 m/s collides head on with a a 0.220 kg ball at rest. If the collision is perfectly elastic, what will the speed and direction of each ball after the collision?
8. Two billiard balls of equal mass undergo a perfectly elastic head on collision. If one ball’s initial speed was 2.00 m/s and the other’s was 3.00 m/s in the opposite direction, what will their speeds be after the collision?
9. A 920 kg sports car collides into the rear end of a 2,300 kg SUV stopped at a red light. The bumpers lock, the brakes are locked and the two cars skid forward 2.8 meters before stopping. The police officer, knowing that the coefficient of kinetic friction between tires and roadway is 0.80 calculates the speed of the sports car at impact. What was it?
10. A radioactive nucleus at rest decays into a second nucleus, an electron and a neutrino. The electron and neutrino are emitted at right angles and have momenta of 9.30 x 10^-23 kg m/s and 5.40x 10^-23 kg respectively. What are the magnitude and direction of the momentum of the second (recoiling) nucleus?